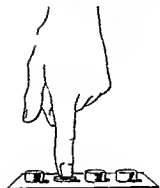




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DO**



**MAKING IDEAS WORK  
AUTOMATICALLY**

## relay magic

### FOREWORD

Relay Magic is one of a series of pocket books prepared by the Industrial Products Division of Automatic Electric. The booklets are designed to provide useful engineering information in a handy form. Others include Relay Terms, Basic Circuits, Conversion Factors, and Tables & Formulas.

We recommend that the information in this book be used only as a guide to determine the availability of a circuit and its components. Remember, even the best and most time-proven circuit may fail because of the wrong choice of equipment. For this reason we make no attempt to define specific electrical parameters or component values.

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(using AE's Series OCS "stepper")

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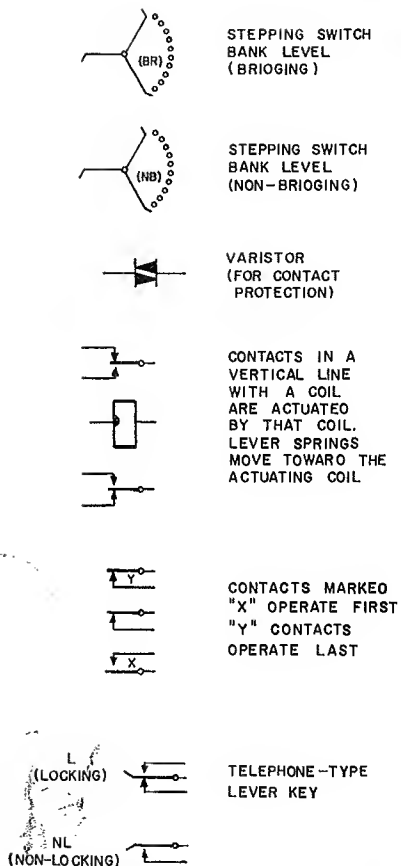
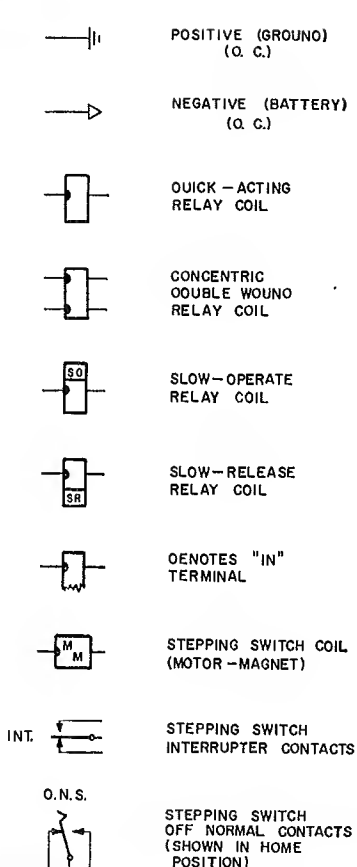


Fig. 1. Symbols, abbreviations and drawing practices.

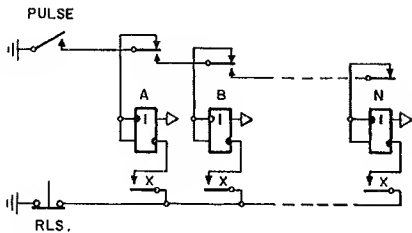


Fig. 2. Counting chain, one relay per step.

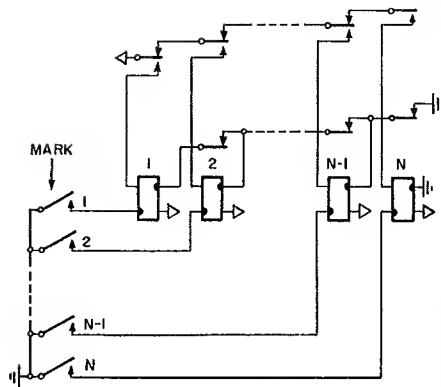
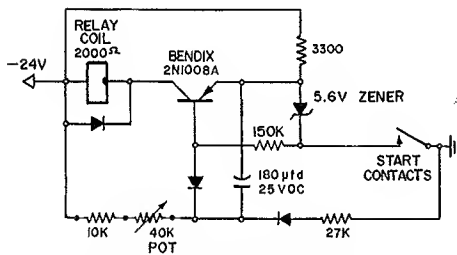


Fig. 4. Random or "jump" finder.



OPERATE DELAY ADJUSTABLE FROM  
QUICK ACTING TO APPROX. 10 SECS.  
TEMP. COMP. - 0° - 100° F

Fig. 3. Zener-stabilized slow-operate relay.

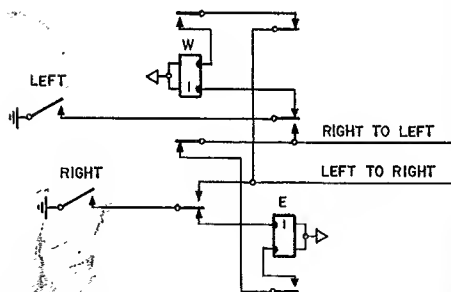


Fig. 5. Direction of phase markers.



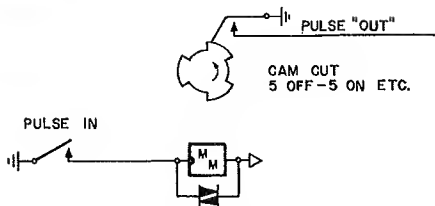


Fig. 9. 30-point OCS Relay used as a 5-to-1 divider.

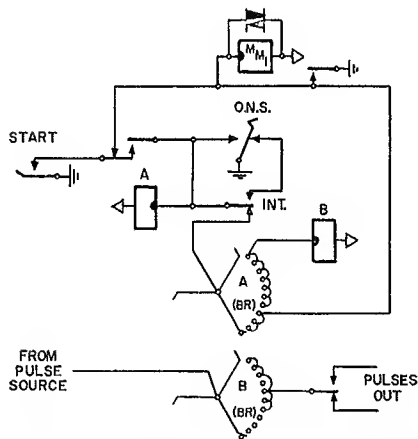


Fig. 10. Code sender or pulse multiplier. (Characteristics of "B" control the pulse frequency and % make.)

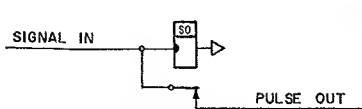


Fig. 11. Pulse shortener.

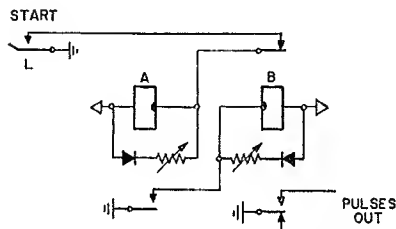


Fig. 12. Simple variable-pulse generator.

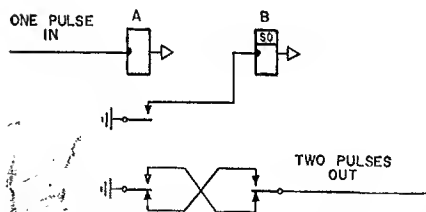


Fig. 13. Pulse doubler. (Relay "B" is slow to operate and slow to release.)



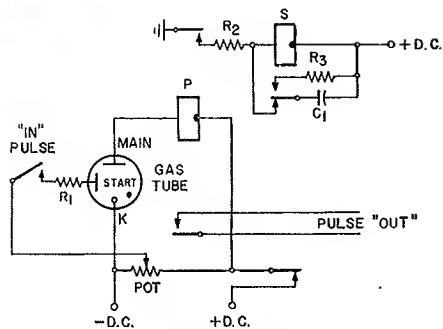


Fig. 14. Gas-tube pulse stretcher

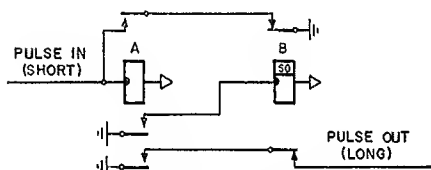


Fig. 15. Pulse stretcher (2-relay).

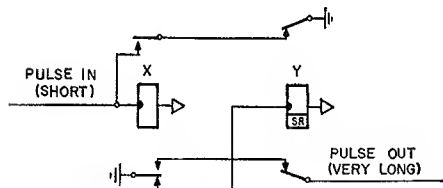


Fig. 16. Pulse stretcher (2-relay).

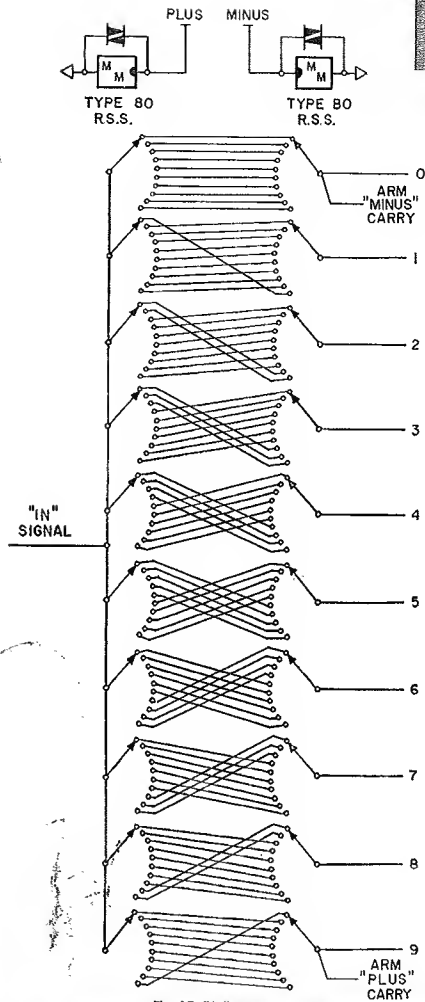


Fig. 17. Bi-directional decade.

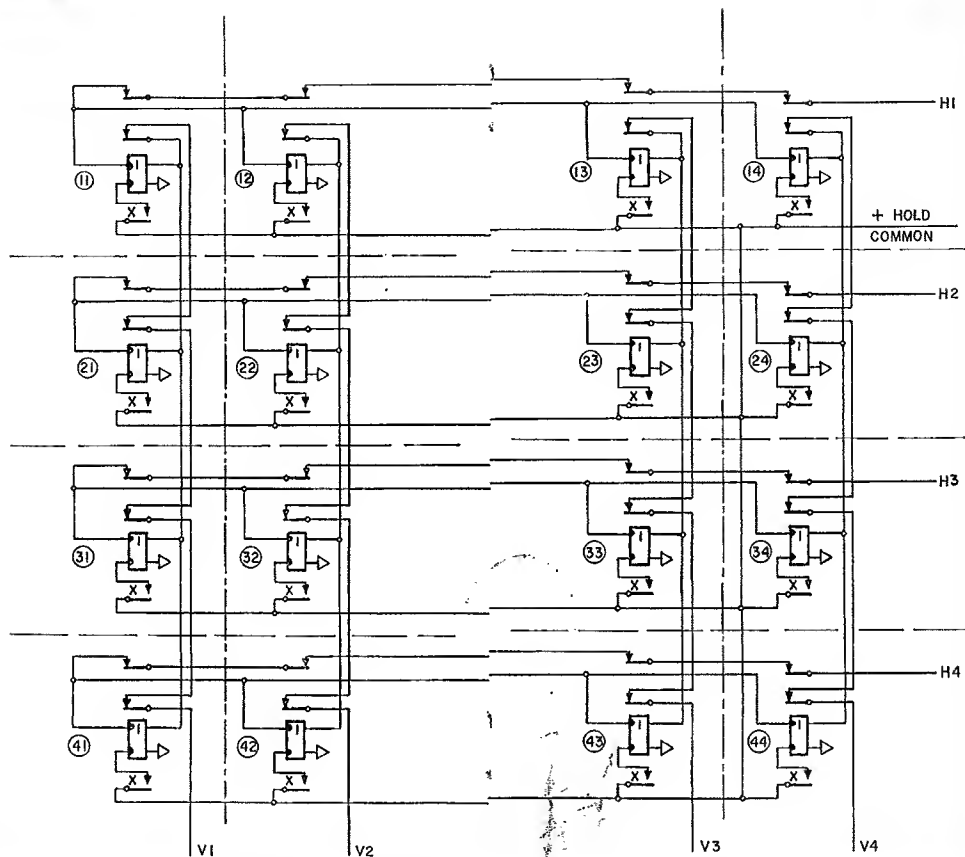


Fig. 18. Relay matrix, 4 x 4 full cross program.

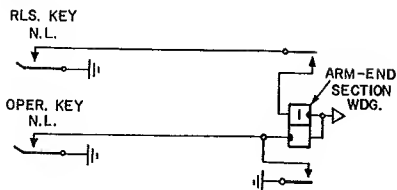


Fig. 19. Usual method of operating, holding and releasing double-wound relay.

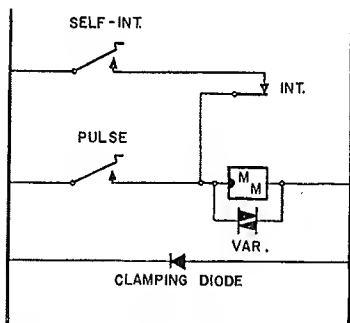
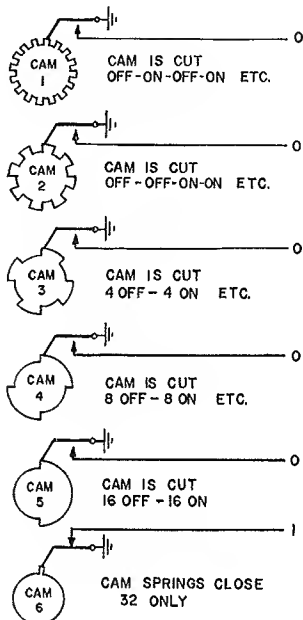
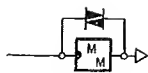


Fig. 20. Rotary stepping switch circuit with diode for reduction of electrical noise.



NOTE: This is a schematic presentation for simplicity. Cams may be rearranged for proper load distribution.

**Fig. 21. AE's 32-point OCS Relay used as a binary readout.**  
(Shown in position 32).

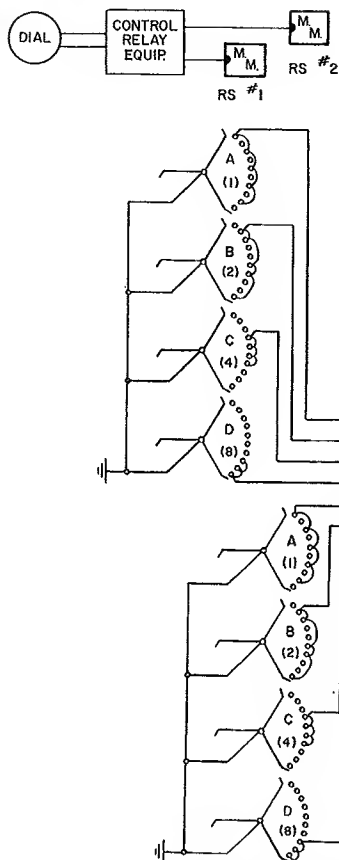


Fig. 22. Decimal-to-binary conversion.

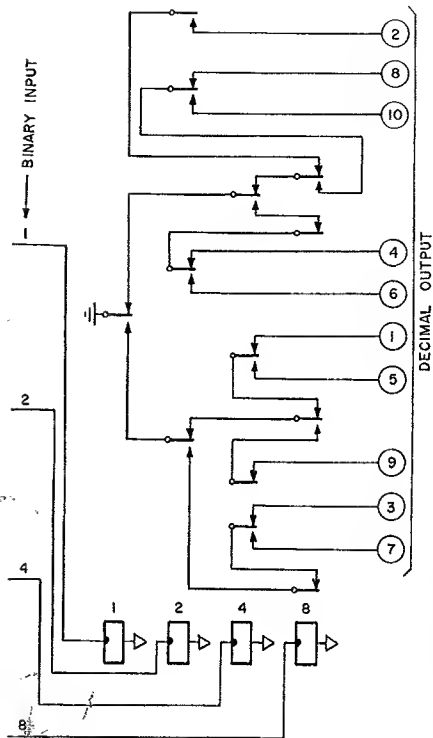


Fig. 23. Binary-to-decimal conversion.

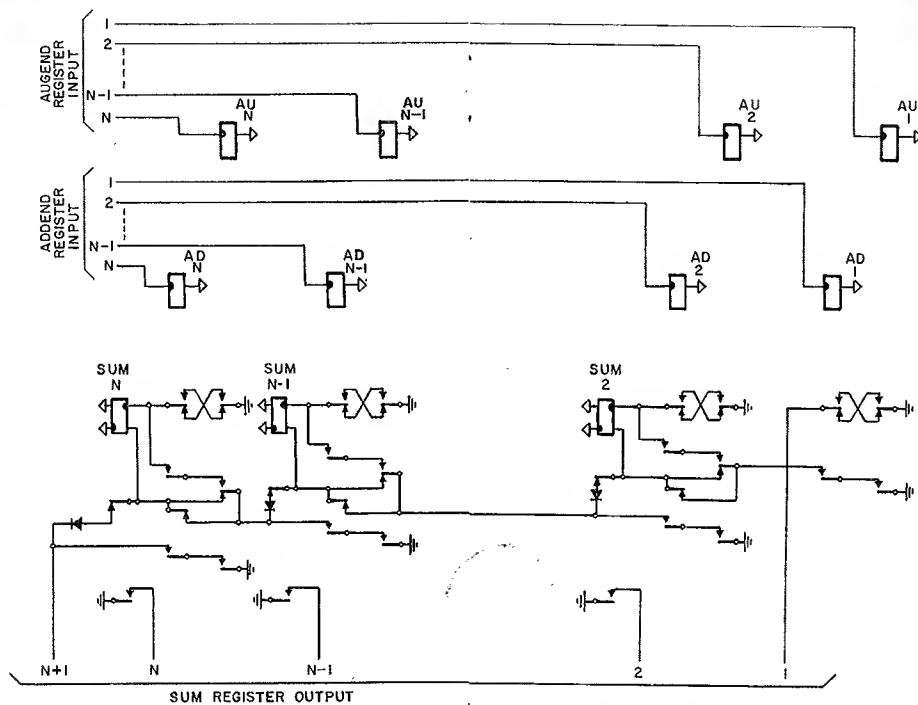


Fig. 24. Addition of numbers in binary form.

"IN" CARRY	AUGEND	ADDEND	SUM	"OUT" CARRY
NO	0	0	0	NO
NO	1	0	1	NO
NO	0	1	1	NO
NO	1	1	(1) 0	YES
YES	0	0	1	NO
YES	1	0	(1) 0	YES
YES	0	1	(1) 0	YES
YES	1	1	(1) 1	YES



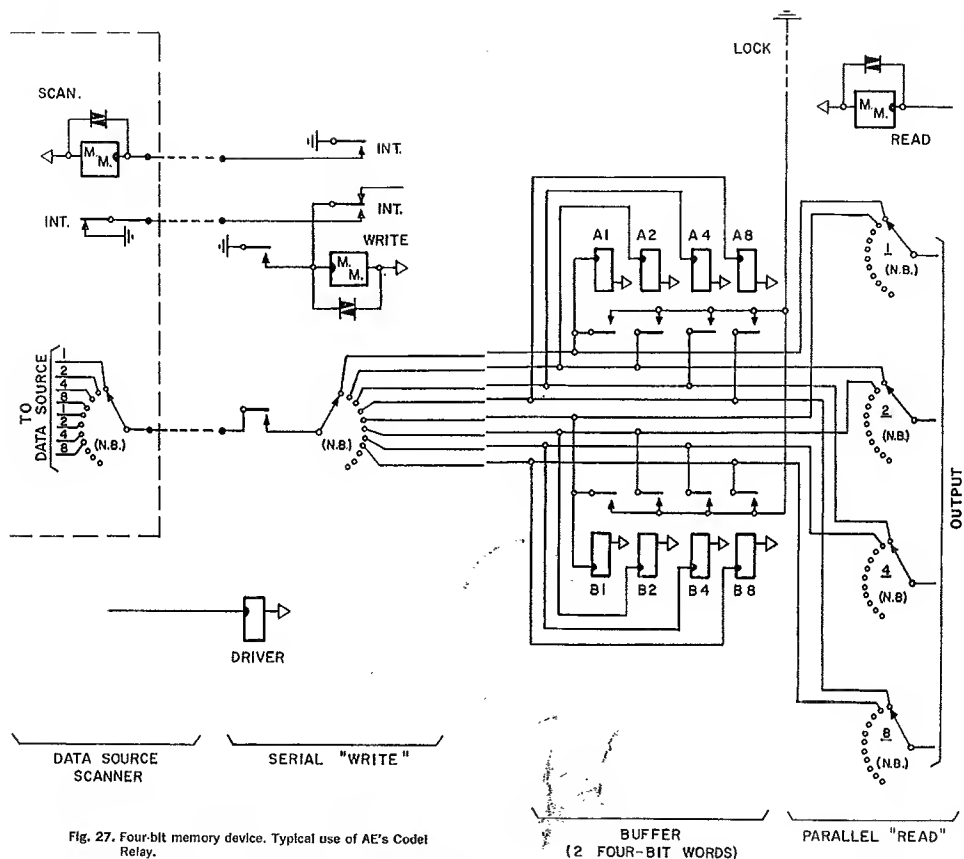
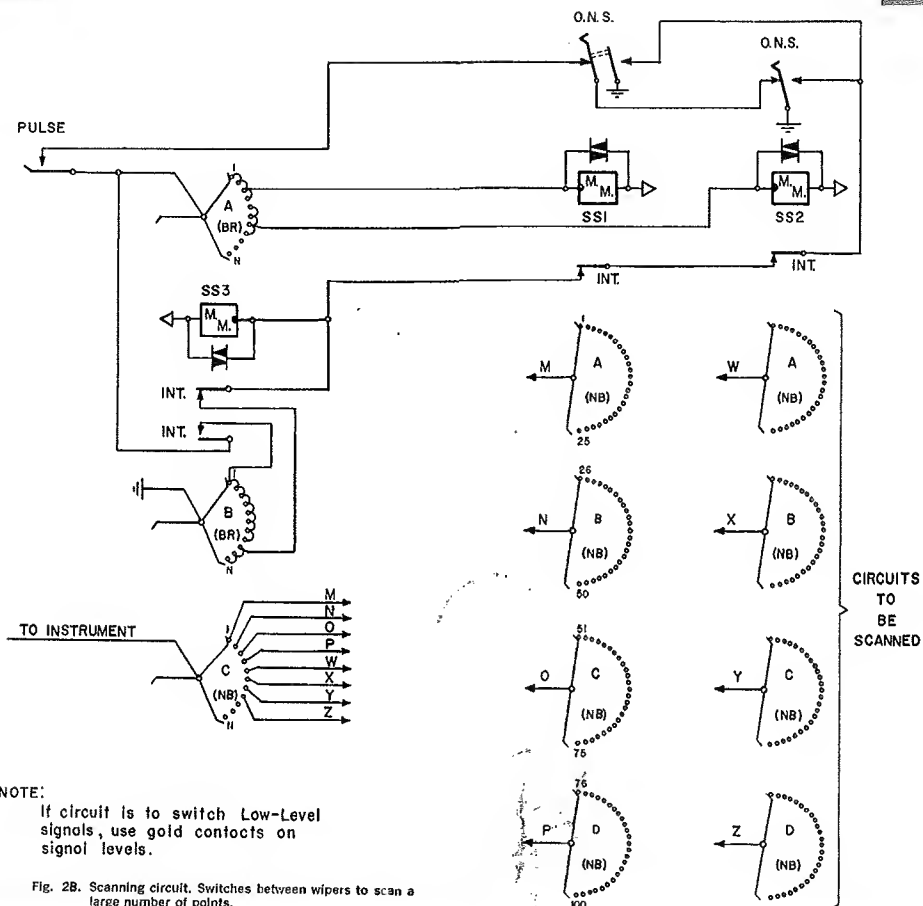


Fig. 27. Four-bit memory device. Typical use of AE's Codet Relay.





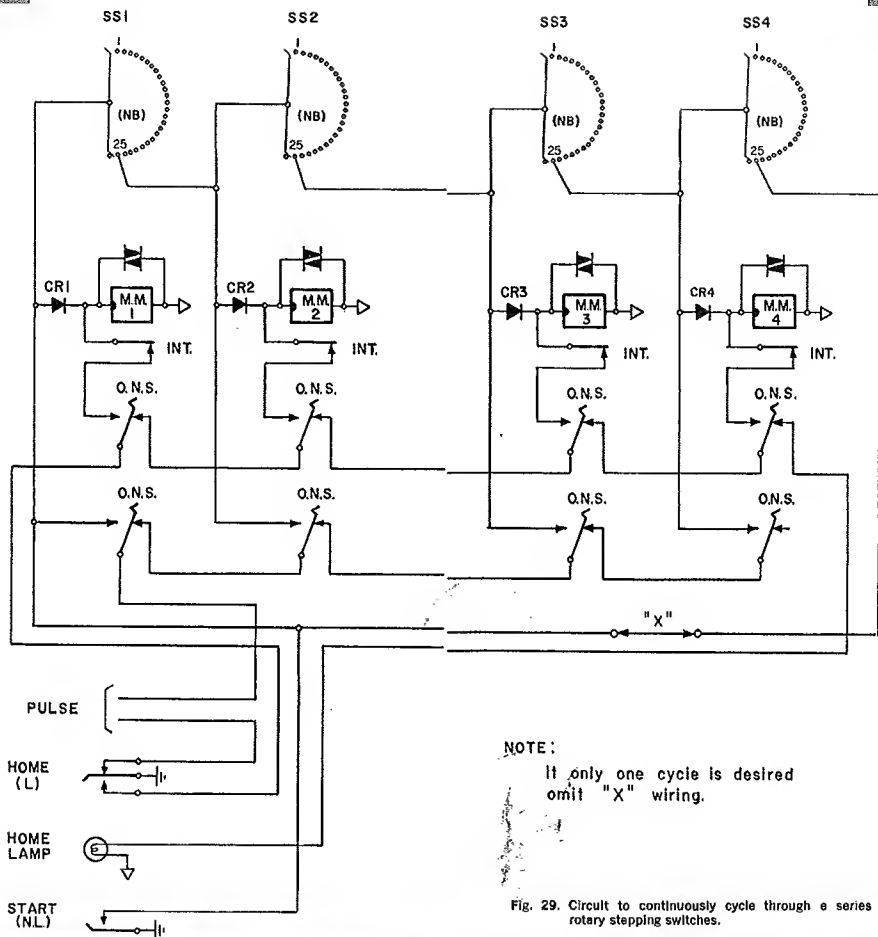


Fig. 29. Circuit to continuously cycle through a series of rotary stepping switches.

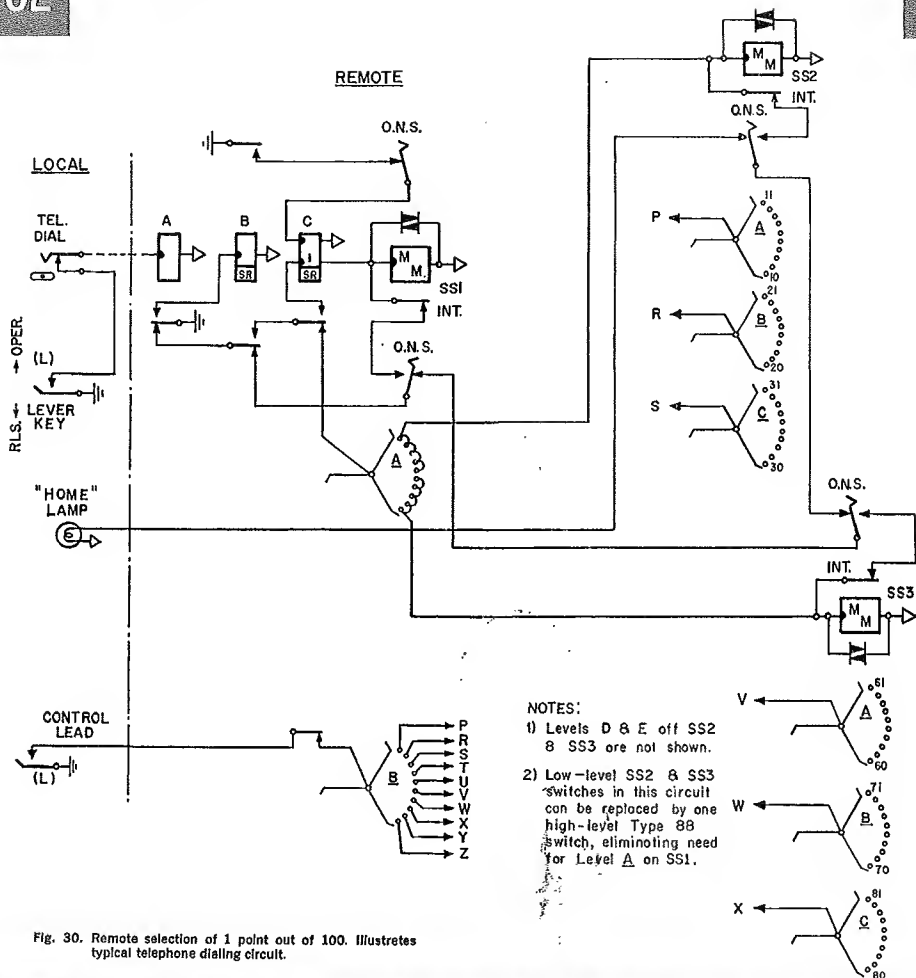
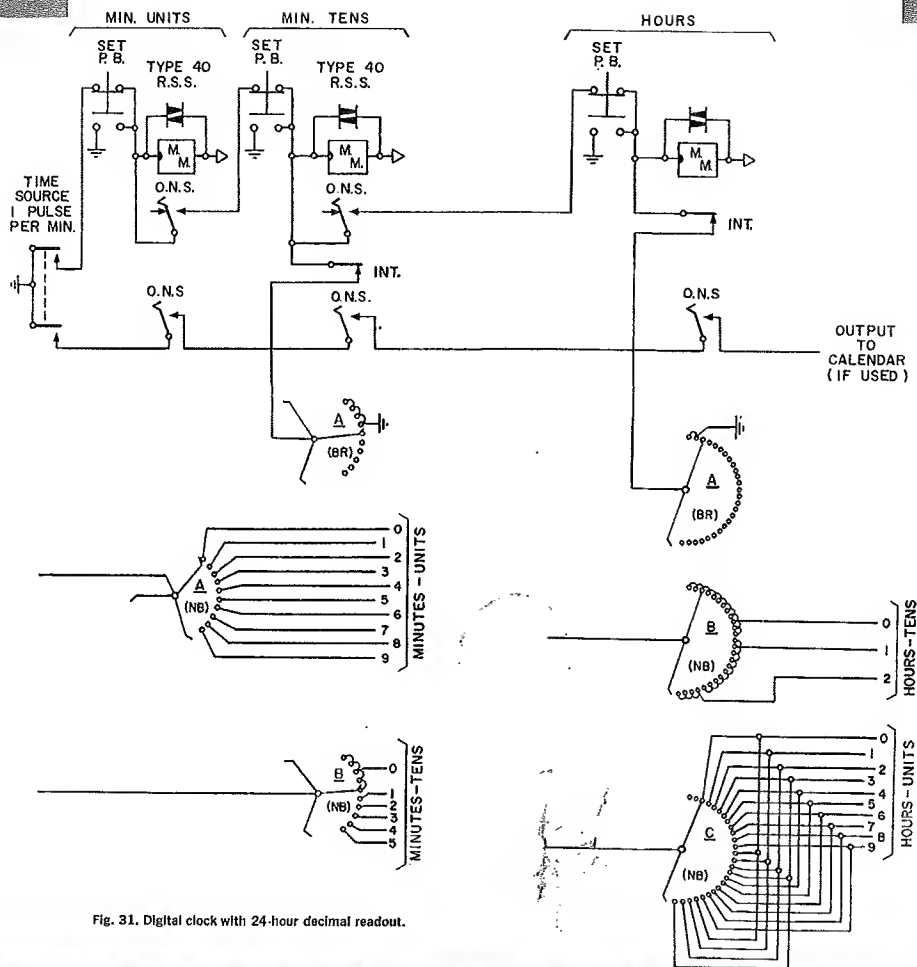


Fig. 30. Remote selection of 1 point out of 100. Illustrates typical telephone dialing circuit.



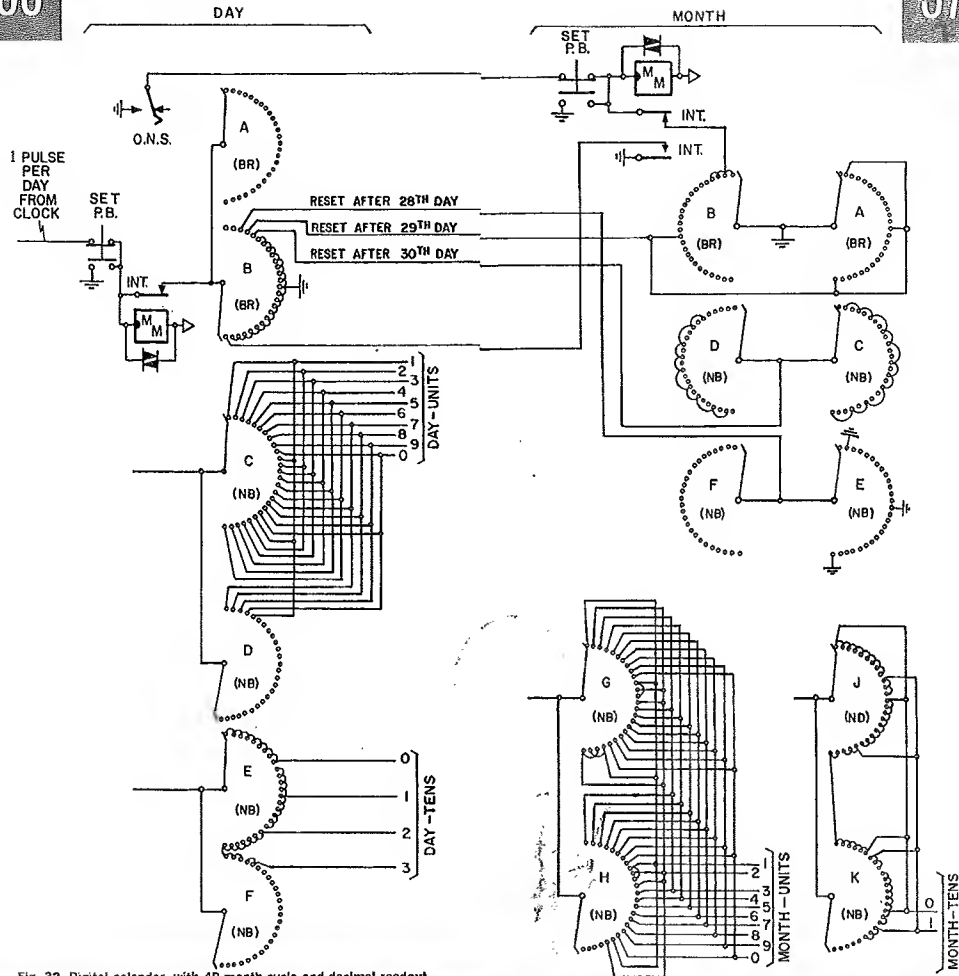


Fig. 32. Digital calendar, with 48 month cycle and decimal readout.

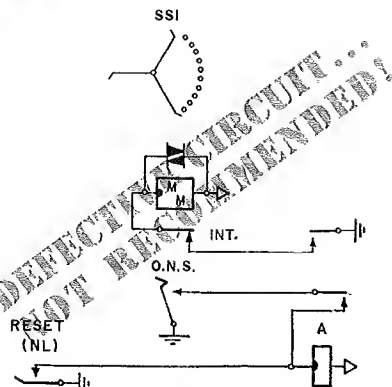


Fig. 33, Trap #1. Stopping a self-interrupted rotary stepping switch by releasing a relay.

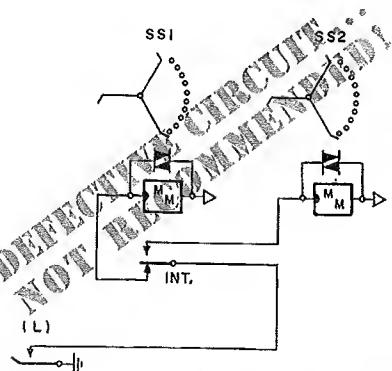


Fig. 34, Trap #2. Synchronizing self-interrupted rotary stepping switches.

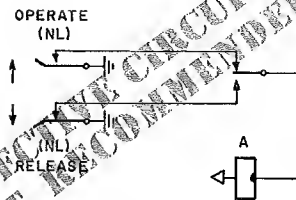


Fig. 35, Trap #3. Switching a relay's coil circuit with a Form C contact.

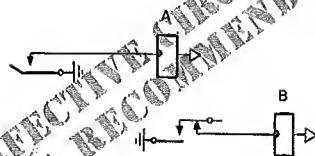


Fig. 36, Trap #4. Operating a relay with a pulse from a Form D.

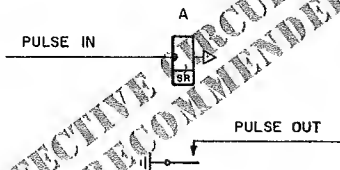


Fig. 37. Trap #5. Pulse-stretching with one relay.

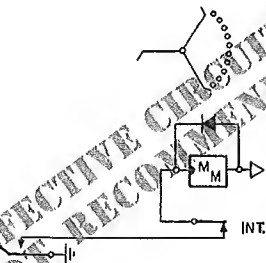


Fig. 38. Trap #6. Use of a diode as a spark-suppressor on a self interrupted rotary stepping switch.

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